UNITED
NATIONS

ST

Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/26/Add.3
29 July 1997

Original: ENGLISH

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods

REPORT OF THE SUB-COMMITTEE OF EXPERTS ON ITS THIRTEENTH SESSION

(Geneva, 7-17 July 1997)

Addendum 3

Annex 4

Report of the UN/ILO Working Group on harmonized classification criteria for physical hazard

1 The UN/ILO Working Group on harmonized classification criteria for physical hazards met on 14 and 15 July 1997 under the chairmanship of Mr. G. Oberreuter (Germany).

2 Representatives from Austria, Argentina, Belgium, Brazil, Burkina Faso, Canada, China, France, Finland, Germany, Italy, Iran, Japan, Mexico, Netherlands, New Zealand, Nigeria, Norway, Poland, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States of America, Tunisia, International Labour Office (ILO), International Maritime Organization (IMO), European Commission (EC), European Chemical Industry Council (CEFIC), European Committee of Paint, Printing Ink Artists Colour Manufacturer's Associations (CEPE), European Industrial Gases Association (EIGA), European Fertilizer Manufacturers's Association (EFMA), Hazardous Materials Advisory Council (HMAC), International Air Transport Association (IATA), Federation of European Aerosol Associations (FEAA) participated in the Working Group session.

3. The chairman had prepared a guidance document (ST/SG/AC.10/C.3/1997/26) on the basis of the outcome of the discussions during the last biennium and the report of the Working Group on its last session (ST/SG/AC.10/23/Add.4) where the remaining points to be discussed were underlined.

Aerosols

Documents: **ST/SG/AC.10/23/Add.4, Table 5**
ST/SG/AC.10/R.509 (Germany)
ST/SG/AC.10/R.532 (Norway)
ST/SG/AC.10/C.3/R.764 (United Kingdom)
ST/SG/AC.10/C.3/1997/26 (Chairman)
ST/SG/AC.10/C.3/1997/27 (Chairman)
ST/SG/AC.10/C.3/1997/30 (Germany)
ST/SG/AC.10/C.3/1997/37 (United Kingdom)
ST/SG/AC.10/C.3/1997/43 (European Commission)

Informal documents: **INF.21 (United States)**
INF.27 (Argentina)

Definition for aerosols

4. The Working Group discussed first the definition of aerosols. It was agreed that this word had not to be defined from a scientific standpoint (i.e. as a gas containing liquid or solid particles in suspension), as it had to be interpreted broadly as commonly understood by consumers, i.e. as a dispenser containing a substance which is expelled by a gas through a release valve.

5. The Working Group agreed that the receptacle itself should not be limited to metal receptacles, as plastics and glass receptacles may also be used.

6. The representative from Germany proposed that the receptacles should not be restricted to non-refillable receptacles, as the industry in his country already uses refillable aerosol dispensers for some purposes. There was no general support for that proposal because it was generally considered that this definition had to be interpreted in conjunction with the construction and testing provisions applicable to that kind of specific articles, which would be made different if the receptacle had to be refilled. The general view was that the representative of Germany should make proposals to the UN Sub-Committee of Experts on the Transport of Dangerous Goods for developing suitable transport conditions for refillable receptacles, if deemed necessary.

7. The Working Group agreed that the most suitable definition was that in the UN Recommendations on the Transport of Dangerous Goods with the minor editorial amendments as described in document ST/SG/AC.10/C.3/1997/37.

8. On a proposal by Belgium, supported by Canada and the United States, it was agreed to include the word "self-closing" before "release-device", as they appear in the ICAO Technical Instructions and in the United States and Canada transport regulations. However, these words were placed between square brackets to allow representatives to discuss the implications with their industry.

9 The representative of FEAA said that aerosols with non self-closing valves existed (for example aerosols with slow release valves used for medical care). She said that she would provide appropriate examples for the next session.

Flammability criteria for aerosols

10 The Working Group agreed that, for classification purposes, all flammable components contained in the aerosol dispenser should be taken into account, should they be in the solid, liquid or gaseous forms and the flammability of the components should be determined according to the criteria applicable to these components.

11 It was noted however that the approaches for classifying the aerosols as flammable differed depending on the regulatory system. According to the UN Recommendations on the Transport of Dangerous Goods, the classification as flammable depends on the percentage or mass of flammable components. According to transport by air regulations and United States transport, consumer protection and workplace safety regulations, classification is based on tests on the flammability of the released gas. According to European Union consumer protection legislation, all aerosols containing flammable components are to be considered as flammable, but derogations are permitted on the basis of tests and provided that the amount of flammable components is indicated on the dispenser. Finally, for storage purposes, the United States National Fire Protection Association considers that the heat of chemical combustion should also be taken into account.

12 The discussion showed that it might not be easy to develop harmonized criteria for the flammability of aerosols, as each classification system was based to a certain extent on risk assessment considerations specific to the situation and because the hazards during transport and storage were quite different from those related to the use of aerosols. Some delegations felt that it would be appropriate to develop criteria for each system (transport, storage, workplace safety, consumer protection). However some delegations felt that users or workers would not understand why aerosol dispensers considered as flammable when transported or stored may not be required to be labelled as flammable for consumer protection purposes.

13 It was agreed that the question of a minimum content of flammable component for classification as flammable could be rediscussed, and that this minimum content could eventually serve as a criterion for transport/storage purposes.

14 It was also agreed that the question of flammability test would also have to be discussed, as the European Commission was developing a test which would be different from that required under the ICAO Technical Instructions and United States regulations. It was underlined that the test results obtained from the two methods should be compared. It was suggested that the test criteria could be used for workplace safety and consumer protection purposes.

15 The representative of FEAA said that she would prepare a comprehensive proposal for the next session that would take account of the needs of each regulatory system.

Criteria for reactive properties

Basic documents : **ST/SG/AC.10/C.3/1997/28 (Chairman)**
ST/SG/AC.10/23/Add.4

Spontaneous combustion

16. The Working Group agreed to propose the criteria of the UN Recommendations on the Transport of Dangerous Goods for self-heating substances and pyrophoric substances.

17. The representative of New Zealand felt that a lower cut-off limit should be included for self-heating substances, as explained in informal document INF.3 paragraphs 24, 25 and 37 (f). As the proposed lower cut-off limit was not included in existing classification systems, the Working Group felt that it could be taken into account only if it were documented by evidence of a need for such a lower limit. The representative of New Zealand was invited to provide a justification and background information in a formal document for the next session. It was also underlined that the package related limits in the UN Recommendations might be more conservative than those purely related to test results.

Water-reactive properties

18. For the emission of flammable gases in contact with water, the Working Group agreed to propose the criteria of the UN Recommendations.

Document : ST/SG/AC.10/C.3/R.732 (Canada)

19. The Working Group discussed whether substances reacting on contact with water to give off toxic or corrosive gases should be included in the harmonized system. There are at present no criteria in the transport regulations for that hazard, but this property is mentioned in the IMDG Code and reaction with water is also taken into account for emergency response purposes in European road and rail transport regulations.

20. It was generally felt that cooperation with OECD would be necessary for this matter, as reaction with water was a property falling within the competence of the group and the toxicity and corrosivity of the gases evolved were properties falling within the competence of OECD. The representative from Canada was invited to submit a proposal to OECD and a separate one to the Sub-Committee. The question of allocation of division numbers and transport labels would be a matter to be discussed by the Sub-Committee of Experts on the Transport of Dangerous Goods once any criteria for classification have been established.

Oxidizing properties of solids and liquids

21. The Working Group agreed to propose the criteria of the UN Recommendations on the Transport of Dangerous Goods for oxidizing liquids and solids.

Oxidizing properties of gases

Document : ST/SG/AC.10/C.3/R.709 (Germany)
Informal document : INF.24 (Germany)

22. The representative from Germany recalled that he had been invited to consult ISO on this subject and as a result he had submitted a proposal to ISO (INF.24). Members of the Working Group were invited to

transmit their written comments on this proposal to the representative of Germany. However, in the interim period, the Working Group agreed to base its proposal on the existing criteria with a reference to ISO 10156.

Ammonium nitrate and ammonium nitrate fertilizers

Document : **ST/SG/AC.10/C.3/R.749 (Germany)**
ST/SG/AC.10/C.3/1997/8 (EFMA)
ST/SG/AC.10/C.3/1997/31 (Germany)
Informal document : **INF.5 (HMAC)**

23. It was recalled that ammonium nitrate fertilizers in the Recommendations on the Transport of Dangerous Goods were classified on the basis of their composition, and in addition for UN 2071, on the basis of the test prescribed in section 38.2 of the Manual of Tests and Criteria.

24. Several delegations considered that the additional "Steel tube detonation" test prescribed in the European Union legislation and in the IMO Bulk Cargo Code (Test D.5) would be needed for determining whether or not certain explosive properties are to be considered, especially for new types of ammonium nitrate fertilizer. They considered that such a test could be referenced in the globally harmonized system.

25. Other delegations felt that the present classification in the UN Recommendations adequately addressed the present situation as regards the types of fertilizers presently on the market, and that this classification was suitable for safety purposes without any need for an additional test. They were opposed to the introduction of such a test.

26. As the views were very divided on this subject and as ammonium nitrate fertilizers were a special case, the Working Group considered that this case should not be addressed in the global harmonized system, and that, if there was a need for such a detonation test or new entries for such fertilizers in the UN Recommendations, this matter should be referred to the Sub-Committee of Experts on the Transport of Dangerous Goods.

Organic peroxides

Documents : **ST/SG/AC.10/C.3/1997/11 (CEFIC)**
ST/SG/AC.10/C.3/1997/12 (CEFIC)
ST/SG/AC.10/C.3/1997/32 (Germany)
Informal documents : **INF.11 (CEFIC**
INF.3 (New Zealand)
INF.18 (United Kingdom)

27. The Working Group noted that the European Commission had withdrawn its document ST/SG/AC.10/C.3/R.775 where a lower limit of 0.5% available oxygen derived from the organic peroxides with not more than 1% hydrogen peroxide had been proposed, instead of the 1% transport regulations limit.

28. The representative of France underlined that no convincing argument that would justify the lower limit of 0.5% of available oxygen used in the EC system had been presented, and that organic peroxides with not more than 1% hydrogen peroxide and with 0.5 to 1% available oxygen tested in accordance with the flow-chart of the UN Recommendations would be assigned to type G and therefore would be exempted anyway.

29. The Working Group agreed to propose the limits given in the UN Recommendations on the Transport of Dangerous Goods for the harmonized system.

30. The representative from New Zealand noted that there was another difference between the UN Recommendations and the European Union legislation, as the 0.5% available oxygen limit was applicable to organic peroxides containing 1 to 5% hydrogen peroxide according to the European Union legislation while this limit was applicable to organic peroxides containing 1 to 7% hydrogen peroxide according to transport regulation.

31. It was underlined that this difference of 2% between European consumer protection regulations and transport regulations was not considered as a matter for dispute. The representative from CEFIC said that in the list of currently assigned organic peroxides of the UN Recommendations, all concentrations listed had systematically been increased by 2% because there is a 2% incertitude as to the actual concentration resulting from the manufacturing process.

32. The representative of New Zealand maintained his reservation as to the use of the 7% hydrogen peroxide concentration and therefore the figure was placed between square brackets. He was invited to provide arguments in a formal document for the next session if he wanted to replace that figure by another one.

33. The proposal from Germany ST/SG/AC.10/C.3/1997/32 to associate temperature control considerations to classification criteria was not adopted because the need for temperature control depends on the SADT which depends itself of the size of the package used.

34. The representative from Sweden mentioned that several countries use an additional burning rate test for the purposes of storage regulations. He was invited to submit a written proposal if he felt that that test would be necessary.

35. For document ST/SG/AC.10/C.3/1997/12, it was considered that the CEFIC document dealt with segregation problems related to transport regulations and therefore the problem raised should be addressed by the Sub-Committee of Experts on the Transport of Dangerous Goods only.

36. In document INF.3 (paras. 26 to 32), the representative of New-Zealand mentioned that there was a need to review how classifications are recorded to better communicate the intrinsic hazard of the substance, and to clarify how a specific classification was achieved. The representatives from Canada and the United States objected to any change to the existing classification system on the basis of such an informal document. The representative from New Zealand was invited to submit an official proposal if deemed necessary with appropriate and documented justification.

37. It was agreed that the same tests and criteria as for organic peroxides would be appropriate.

Testing conditions for solids

Informal document : INF.18 (United Kingdom)

38. This document was not discussed. The United Kingdom will submit an official document for discussion at the next session.

Explosive properties

Document : ST/SG/AC.10/C.3/1997/29 (Chairman)

39. The representative from Sweden drew the attention to the fact that the tests and criteria contained in the UN Recommendations on the Transport of Dangerous Goods are applicable to explosives as packaged for transport. He said that in an harmonised system of classification, the fact that the explosives may be handled and used outside the transport package should also be taken into account. He also drew attention to the case of desensitized explosive substances which may dry once they have been extracted from the packaging in which they were contained and therefore may recover their explosive properties. He was invited to address these questions in written proposals for the next session.

40. The representative from the United States said that he could not agree that a distinction should be made between substances designed or intended for explosive or pyrotechnic effects and those which are not intended for such purposes. He recalled that this distinction in the UN Recommendations was made only to avoid unnecessary testing (Test series 1 and 2) as it was obvious that substances or articles designed or intended for such effects were to be considered for classification as explosives.

41. The Working Group discussed whether the words "or solution" should be added in the definition of explosive substances. It was recognized that explosive substances could be pure liquid or solid substances as well as solutions and mixtures, but several delegations felt that the definition currently used in the UN Recommendations was sufficiently clear so as to avoid any misunderstandings even though the word "solution" was not included. It was agreed to keep the definition in line with that of the UN Recommendations for the time being, as this had been agreed by consensus at the previous session (ST/SG/AC.10/23/Add.4, Table 7). New proposals for modification should be submitted through official documents.

42. The representative of Germany suggested to add a definition for pyrotechnic articles. There was support for that proposal but he was also invited to submit an official proposal.

43. Several delegations considered that all explosive intrinsic properties of a substance should be taken into account for classification purposes. Other delegations felt that there were limits to such an approach, because certain substances are indeed liable to generate explosives in certain conditions because of their intrinsic properties, for example flammable liquids, but these properties are not really intrinsic explosive properties, and classification as explosive should be based on specific tests and criteria.

44. It was confirmed that test series A to H should be included in the list of tests suitable for defining explosive properties in the case of organic peroxides and self-reactive substances.

45. The representative of Norway suggested that test series 1 should also be included in the list of tests as he considered that these tests were important in relation with the manufacture of explosives.

46. The representative of Italy and the United States recalled that these subjects had already been discussed at the last session, and that a consensus, reflected in ST/SG/AC.10/23/Add.4, Tables 6 and 7, had been found. They regretted that discussions had been reopened and suggested to stick to the previous agreement.

47. The proposals in document ST/SG/AC.10/C.3/1997/29 prepared by the Chairman led to the question whether it would be appropriate to define different hazard levels corresponding to the various divisions of the transport regulations, and if yes, whether the UN test series (6), which applies to substances and articles as packaged for transport, would be suitable for all regulatory systems.

48. Several delegations considered that test series (6) would be relevant for transport and storage regulations. Certain delegations felt that the tests and criteria for defining hazard levels should be relevant for other purposes, such as the safety of use of substances with explosive properties in manufacturing other chemical products. Other delegations felt on the contrary that the harmonized system was not intended to apply within the production system and that it would not be relevant to try to reach such a level of harmonization.

49. As a conclusion, it was agreed to confirm the results of the discussions at the last session, that the presentation of the results should be done in the same manner as for other hazards (definitions, criteria, test methods). It was also agreed that the globally harmonized system should be relevant for all regulatory systems concerning explosives in a packaged form and that the need for further harmonization with regulatory systems concerning explosive substances in a non-packaged form would need further consideration. Priority should be given to the work on explosive substances, and the work on articles should follow.

50. The Chairman said that he would present a new draft document for the next session, and that any new ideas or proposals should be submitted as official proposals before the official deadlines (i.e. proposals have to be received by the secretariat in paper form (to the exclusion of telefaxes) or preferably in electronic form at the latest by 26 September 1997).

51. The representative from the United States requested that only those points which had been agreed by the Working Group should be reflected in this new draft document. New elements would have to be addressed separately in specific documents.

Annex

Proposals for a globally harmonized system of classification of chemicals presenting physical hazards

Note 1: This annex has been prepared by the secretariat on the basis of the results obtained by the Working Group by consensus in 1995 and 1996 (ST/SG/AC.10/23/Add.4), and at this session (ST/SG/AC.10/C.3/CRP.2/Add.10).

Note 2: The term "Manual of Tests and Criteria", wherever it is used in this Annex, means the second revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.2).

1. Proposal for definitions of gases, liquids and solids

Definitions	
Definition of gases and gas mixtures (substances, mixtures and solutions with a lower vapour pressure are regarded as liquids)	Vapour pressure at 50 °C > 300 kPa or completely gaseous at 20 °C (at standard pressure of 101.3 kPa)
Definition of liquids (substances not falling under this definition are regarded as solids)	Melting point ≤ 20 °C at 101.3 kPa or for viscous substances without a defined melting point, test according to ASTM D 4359-90 or penetrometer test as prescribed in Annex A.3 of the ADR */ with penetrometer according to ISO 2137:1985

* *European Agreement concerning the International Carriage of Dangerous Goods by Road (ECE/TRANS/115, United Nations publication Sales No. E.96-VIII-2).*

2. Proposals concerning flammability

2.1 Proposal for hazard levels for the classification of flammable liquids

Hazard level	Uniform hazard description	Criteria	Test methods
Very high danger	To be developed	Initial boiling point ≤ 35 °C and flashpoint < 23 °C	Closed cup methods to be used, open cup methods only acceptable in special cases (may be determined)
High danger	To be developed	Flashpoint < 23 °C and initial boiling point > 35 °C	
Medium danger	To be developed	Flashpoint > 23 °C and ≤ 60 °C	
Low danger	To be developed	Flashpoint > 60 °C and ≤ 93 °C	

***Note**: Gas oils, diesel and light heating oils in the flashpoint range of 55 °C to 75 °C may be regarded as a special group for some regulatory purposes.*

2.2 Proposal for hazard levels for the classification of flammable solids

Hazard level	Uniform hazard description	Criteria	Test methods
High danger	Not applicable	-	-
Medium danger	To be developed	Screening test: testing time 2 min (20 min for metal powders) Burning rate test: Substances other than metal powders: wetted zone does not stop fire and burning time < 45 s or burning rate > 2.2 mm/s Metal powders: burning time ≤ 5 min	Method as described in section 33.2.1 of the Manual of Tests and Criteria
Low danger	To be developed	Method and test as described above Burning rate test Substances other than metal powders: wetted zone stops the fire for at least 4 minutes and burning rate < 45 s Metal powders : burning time > 5 min and ≤ 10 min	

2.3 Proposal for hazard levels for the classification of flammable gases

Hazard level	Uniform hazard description	Criteria and test methods
High danger	To be developed	Gases and gas mixtures, which at 20 °C and a standard pressure of 101.3 kPa, (a) are ignitable when in a mixture of 13 % or less by volume in air; or (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit. Flammability should be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO 10156:1996). Where insufficient data are available to use these methods, tests by a comparable method recognized by the competent authority may be used.
Medium danger	To be developed	Gases or gas mixtures, other than those of high danger, which, at 20 °C and a standard pressure of 101.3 kPa, have a flammable range in mixture in air.
Low danger	Not applicable	Not applicable

Note: *Ammonia and methyl bromide may be regarded as special cases for some regulatory purposes.*

2.4 Proposal for the definition of aerosols and criteria for their classification

"Aerosols, this means aerosol dispensers, are any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a [self-closing] release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state."

Criteria for flammability remain to be developed.

3. Proposals concerning reactivity

3.1 Proposal for the definition of pyrophoric substances and criteria for hazard levels for their classification

3.1.1 Definition

Pyrophoric substances are solid or liquid substances which, even in small quantities, are liable to ignite within a short period of time after coming into contact with air.

3.1.2 Criteria for hazard levels

Pyrophoric substances (Liquids)		
Hazard level	**Criteria**	**Test methods**
High danger	The liquid ignites in the first part of the test, or if it ignites or chars the filter paper.	UN Test N.3 Manual of Tests and Criteria (par. 33.3.1.5.4)
Medium danger	Not applicable	Not applicable
Low danger	Not applicable	Not applicable

Pyrophoric substances (Solids)		
Hazard level	**Criteria**	**Test methods**
High danger	The sample ignites in one of the tests.	UN Test N.2 Manual of Tests and Criteria (par. 33.3.1.4.4)
Medium danger	Not applicable	Not applicable
Low danger	Not applicable	Not applicable

3.2 Proposal for the definition of self-heating substances and criteria for hazard levels for their classification

3.2.1 Definition

Self-heating substances are solid or liquid substances other than pyrophoric substances which, in contact with air and without energy supply, are liable to self-heating; these substances will ignite only when in large amounts and after long periods of time.

3.2.2 Criteria for hazard levels

Self-heating substances		
Hazard level	**Criteria**	**Test Methods**
High danger	Not applicable	Not applicable
Medium danger	Positive result in a test using a 25 mm sample cube at 140 °C	UN Test N.4 Manual of Tests and Criteria (par. 33.3.1.6.4.3)
Low danger	(a) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and the substance is to be packed in packages with a volume of more than 3 m^3; (b) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C, a positive result is obtained in a test using a 100 mm cube sample at 120 °C and the substance is to be packed in packages with a volume of more than 450 litres; c) A positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm cube sample at 140 °C and a positive result is obtained in a test using a 100 mm cube sample at 100 °C	UN Test N.4 Manual of Tests and Criteria (par. 33.3.1.6.4.4)

3.3 Proposal for the definition of substances which, in contact with water, emit flammable gases, and criteria for hazard levels for their classification

3.3.1 Definition

Substances, which in contact with water, emit flammable gases are solid or liquid substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

3.3.2 Criteria for hazard levels

Substances which, in contact with water, emit flammable gases		
Hazard level	**Criteria**	**Test methods**
High danger	Any substance which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 litres per kilogram of substance over any one minute	UN Test N.5 Manual of Tests and Criteria (par. 33.4.1.4.4.2)
Medium danger	Any substance which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 litres per kilogram of substance per hour, and which does not meet the criteria for high danger	UN Test N.5 Manual of Tests and Criteria (par. 33.4.1.4.4.3)
Low danger	Any substance which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 1 litre per kilogram of substance per hour, and which does not meet the criteria for high and medium danger	UN Test N.5 Manual of Tests and Criteria (par. 33.4.1.4.4.4)

3.4 Proposal for the definition of oxidizing substances and criteria for hazards levels for their classification

3.4.1 Definition

Oxidizing substances are

- liquid or solid substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material,
- gases which may, generally by providing oxygen, cause, or contribute to, the combustion of other material more than air does.

3.4.2 Criteria for hazard levels

Oxidizing substances (Liquids)		
Level	**Criteria**	**Test methods**
High danger	Any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of substance and cellulose is less than that of a 1:1 mixture, by mass, of 50% perchloric acid and cellulose	UN Test O.2 Manual of Tests and Criteria (par. 34.4.2.4.2)
Medium danger	Any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose, and the criteria for high danger are not met	UN Test O.2 Manual of Tests and Criteria (par. 34.4.2.4.2)
Low danger	Any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose, and the criteria for high and medium danger are not met	UN Test O.2 Manual of Tests and Criteria (par. 34.4.2.4.2)

Oxidizing substances (Solids)		
Hazard level	**Criteria**	**Test methods**
High danger	Any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose	UN Test O.1 Manual of Tests and Criteria (par. 34.4.1.4.2)
Medium danger	Any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for high danger are not met	UN Test O.1 Manual of Tests and Criteria (par. 34.4.1.4.2)
Low danger	Any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for high and medium danger are not met	UN Test O.1 Manual of Tests and Criteria (par. 34.4.1.4.2)

Criteria for oxidizing gases still to be developed. Reference to ISO 10156 may be possible unless a revised or new ISO standard is issued (refer to paragraph 22 of this report).

3.5 Proposal for the definition of organic peroxides and criteria for their classification

3.5.1 Definition

Organic peroxides are liquid or solid organic substances which contain the bivalent -0-0- structure and may be considered derivates of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals.

3.5.2 Criteria for classification

Organic peroxides	
Criteria	**Test methods**
Any organic peroxide, except organic peroxides or organic peroxides formulations (a) containing not more than 1.0% available oxygen from the organic peroxides when containing not more than 1.0% hydrogen peroxide; or (b) containing not more than 0.5% available oxygen from the organic peroxides when containing more than 1.0% but not more than [7.0%] hydrogen peroxide. Classification under types A to G in accordance with the criteria of the Manual of Tests and Criteria, Part II ***Note 1***: *Type G is not dangerous for transport.* ***Note 2***: *Sub-divisions may not be necessary for all systems.*	Test series A to H (Refer to Part II of the Manual of Tests and criteria)

3.6 Proposal for the definition of self-reactive substances and criteria for their classification

3.6.1 Definition

Self-reactive substances are thermally unstable liquid or solid substances liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes organic peroxides and substances which are explosive or oxidizing.

3.6.2 Criteria for classification

Self-reactive substances	
Criteria	Test methods
Classification under types A to G in accordance with the criteria of the Manual of Tests and Criteria, Part II ***Note 1*** *Type G is not dangerous for transport.* ***Note 2*** *Sub-divisions may not be necessary for all systems.*	Test series A to H (Refer to Part II of the Manual of Tests and criteria)

3.7 Proposal for the definition of substances related to self-reactive substances

3.7.1 Definition

[to be developed]

3.7.2 Criteria

To be based on the Manual of Tests and Criteria but further improvements need to be discussed.

3.8 Proposal for the definition of explosives and criteria for their classification

3.8.1 Definition

Solid or liquid substances (or mixtures of substances) which are in themselves capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings, including pyrotechnic substances.

Articles containing one or more explosive substances, except devices containing explosive substances in such quantity or of such a character that their inadvertent or accidental ignition shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise.

Substances or articles which are manufactured with the view to producing a practical explosive or pyrotechnic effect.

Note: *a pyrotechnic substance is a substance or mixture of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self-sustaining exothermic chemical reactions. Pyrotechnic substances are regarded as explosive substances even when they do not evolve gases.*

New proposals expected: Refer to paragraph 42 of this report

3.8.2 Criteria for classification

Explosibility according to UN Test series 2 (Section 12 of the Manual of Tests and Criteria).

***Note**: Intentional explosives are not subject to Test series 2.*

Sensitiveness according to UN Test series 3 (Section 13 of the Manual of Tests and Criteria).

Thermal stability according to UN Test series 3(c) (sub-section 13.6.1 of the Manual of Tests and Criteria).

***Note 1**: The UN Transport system differentiates into divisions 1.1. to 1.6 and compatibility groups A to S to distinguish technical requirements.*

***Note 2**: The use of the word "explosive" can have different meanings and interpretation. Reference to "an explosive" or "explosives" is commonly understood to mean substances or articles in Class 1 of the UN scheme, that is those which are intentional explosives or have properties which when assessed under the UN procedure place them in Class 1. The description "explosive" can, however, be used to describe a property and as such it encompasses a wider range of substances than just those in Class 1, for example, substances related to self-reactive substances. The global harmonisation exercise requires that classification is based on intrinsic properties and the word 'explosive' in that context can be used to describe the property of a substance i.e. 'its ability to explode', as well as referring to a substance or article that has been designed to have explosive properties. This can lead to confusion and difficulty but in the above definition 'explosive' refers to substances or articles which would be placed in Class 1 of the UN scheme.*

Further discussion might be needed on if and how to distinguish between the explosive properties of substances and articles designed and manufactured for explosive effects and covered by class 1 of the UN Recommendations on the transport of dangerous goods and the intrinsic property of substances being able to explode, e.g. as further intrinsic property of certain self-reactive substances or certain organic peroxides.

It was agreed that explosive properties of organic peroxides and self-reactive substances should be determined in accordance with the criteria of Part II of the Manual of Tests and Criteria (Tests A to H) (Refer to paragraph 44 of this report).

New proposals expected: refer to paragraphs 39 to 51 of this report

3.9 Proposal for the definition of desensitized explosives and criteria for their classification

3.9.1 Definition

To be developed.

3.9.2 Criteria

To be based on UN Tests (Manual of Tests and Criteria) but further improvements need to be discussed.

3.10 Proposal for the definition of substances which, in contact with water, emit toxic or corrosive gases

[To be developed] (Refer to paragraphs 19 to 20 of this report)

MISCELLANEOUS REMARKS

1. It was recognised that the physical form in which a substance is tested can affect its classification. The UN tests are carried out in the form presented for transport, whereas other tests - especially for handling and use e.g. according to directive 67/548/EEC - may require grinding to a reference standard which gives better information on the comparative intrinsic properties of substances. Before this matter can be completely resolved further discussion is needed (see also paragraph 38 of this report).

2. Screening procedures should be developed and published as voluntary guidance to minimise the cost of testing products. (See also report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its thirteenth session, ST/SG/AC.10/C.3/26, paragraph 111).